Effectiveness of Clinical Information Services

Centre for General Practice
School of Population Health
University of Queensland

December 2002

This document was prepared by the following staff of the Centre for General Practice and the Centre for Evidence-Based Practice at the University of Queensland:

Professor Chris Del Mar
Professor Paul Glasziou
Dr Samantha Hollingworth
Sharon Sanders
Sandi Pirozzo
Dr Eva Pietrzak

December 2002

Glossary **26**
Executive Summary **4**
Introduction **5**
What is a Clinical Information Service (CIS)? 5
Review Methods 5
Literature Searches 6
Email Questionnaires 6
Results **7**
1. General description 7
2. Who were served by the CISs? 9
3. Searching Process 10
4. Service Output 11
5. Evaluation 11
6. Other Aspects 12
6.1 Types of question 12
6.2 Proportion of questions that could be answered 12
6.3 Quality of the evidence 12
6.4 Person time 12
Question 2 **13**
How widespread are clinical information services? 13
Question 3 **13**
Do clinical information services change practitioners' clinical decisions and management? 13
Other services outside the scope of this review **14**
South Essex Question Service - UK 14
Doctorline - Italy
Southern Healthcare Network – Australia
Members' Enquiry Service - UK
Clinical Informatics Consult Service
References and Reports **26**
Clinical Information Services 29
Other Excluded Clinical Information Services 30
Other references 31
Appendix A **33**
Search Strategies 33
Appendix B **36**
Second Email Questionnaire 36
Appendix C **38**
Clinical Information Services Websites 38
Other CIS websites 41
Clinical Informatics Consult Service **42**

Executive Summary

Background: There is increasing interest in finding ways of helping clinicians use the best available evidence in clinical practice. One method is the use of clinical information services (CISs). These can be defined as separate services providing answers for clinicians from the literature, with some interpretation of the literature, rapidly (≤ 14 days).

Aim: To study the use of clinical information services.

Methods: We searched the literature to find reports of CISs. We also emailed three electronic bulletin boards to find others not reported. We combined information published about the services together with responses from direct approaches to the personnel running them.

Results: We identified 12 CISs that met our definition. Most were experimental (with limited funding designed with evaluation rather than long-term service in mind). Four are still running. Australia had 6 services; the UK 4, and New Zealand and Germany one each. Funding came mostly from government health services.
Users were mostly primary care doctors (general practitioners), but also hospital paediatricians, other hospital clinicians, nurses, and allied health professionals. Training in the use of evidence-based practice was provided in the majority. A mixture of clinicians, other scientists and librarians, most of whom were specially trained, ran individual services.
The material was reported back in a variety of ways, usually in summary form, describing the search strategy, and sometimes providing the references, as well as a summary of the findings. Six services provided a summary of reports as an electronic bank for others to use.
Formal evaluation was undertaken by 10 services, all of which reported users self-reported changes in clinical management, as well as general satisfaction. About half of the possible users actually used the service at least once, among those 8 services that could estimate the denominator of potential users. There was a crude range of 1-125 person-days to answer one question, the modal range being about 2-3. This translates into a crude estimate of typically 20 person-days from the service to change a single clinical decision.

Conclusions: Clinical Information services are expensive in personnel (at least). Their value may be greater than this in terms of education and influence in matters not measured.

Introduction

One barrier to using evidence in clinical practice is the difficulty of rapidly accessing relevant research at the point of clinical decision-making. Two strategies that have been employed to try and overcome this barrier are the provision of clinical information services and clinical librarian services.

Literature search service have provided clinical information to clinicians in several feasibility studies (Brassey, Elwyn, Price, & Kinnersley, 2001; Del Mar, Silagy et al., 2001; Hayward et al., 1999). One of these delivered information to clinicians in the UK.(Del Mar, Silagy et al., 2001) The feasibility studies were successful and provided much information of interest both to the clinicians asking for it (who reported changes in clinical decision as a consequence) and also to the wider clinical community, where the information often stimulated debate (Del Mar & Glasziou, 2001, 2002; Del Mar, Glasziou, Spinks, & Sanders, 2001a, 2001b, 2001c, 2001d, 2001e, 2002; Del Mar, Glasziou, Spinks, Sanders, & Hilton, 2001, 2002).

Clinical medical librarian services have been instituted in the UK, USA, Canada and Netherlands and evaluations of these services have been published (Alper, Stevermer, White, & Ewigman, 2001; Davidoff & Florance, 2000; Dodson, 1996; Honeybourne & Ward, 2000; Honeybourne, Ward, & Verschuere, 2002; Killingsworth, 2000; NHMRC, 2000; Urquhart & Davies, 1997; Ward, Honeybourne, & Harrison, 2001; Winning & Beverly, 2001). Further projects are in the process of being conducted (including one funded by NICS).

What is a Clinical Information Service (CIS)?

Clearly there is a wide spectrum of ways in which the literature can be harnessed to help clinicians. These range from clinicians helping the patient looking up information themselves, through to scientists summarising the latest research in a meta-analysis: from library services supplying research papers (and even undertaking literature searches) through to the scientists undertaking the primary research. Somewhere in the middle of these extremes lies a service that has independently evolved in several places in which the literature is searched for a clinician to find a specific answer to a clinical question. To distinguish clinical information services from health care workers own evidence searching or librarians providing lists of references, for the purposes of this review we will define a clinical information services as incorporating the following three features:

1. The personnel providing the service are separate from the clinical service (health care providers) using it.
2. There is a fast response (≤ 14 days).
3. The service must include not only a search for information but also a distillation/interpretive phase.

Review Methods

We conducted a search of electronic databases, grey literature, and reports

relevant to this review.

Literature Searches

The following electronic databases were searched: Medline; The Cochrane Library; SUMSearch; EMBASE; CINAHL; AMI, APAIS and Web of Science from 1995 onwards.

The search strategies are detailed in Appendix A. The citations retrieved by the search strategy were assessed for relevance to the review and according to the above 3 criteria.

All available records were scanned and the abstracts of those relevant to the subject were read. Articles appearing to contain information relevant to the review were obtained and examined. Reference lists of those articles were checked for further sources of pertinent information. The review process is summarized in Table 1 for each of the electronic databases.

Email Questionnaires

We decided to undertake a 'snowballing' technique to flush out any other services that might not have been published. To that end we contacted members of three email bulletin boards as follows:

1 The EBM bulletin Board EVIDENCE-BASED-HEALTH@JISCMAIL.AC.UK
2 The UK Medical Library List Server list LIS-MEDICAL@JISCMAIL.AC.UK
3 The USA Medical Library List Server list MEDLIB-L@LISTSERV.BUFFALO.EDU

We asked the following:

1. Do you provide a CIS? (like Brassey and Del Mar?)
2. Are you aware of any CIS?
3. Do you know of any publications regarding CIS?

A number of responses were received. From these we gleaned information on other CISs and a number of citations. These were retrieved if possible. Then we sent another message to each of the respondents we had thereby identified (that is, identified themselves as having provided a CIS, or we found from a citation or other respondent that they had done so). This message was an extensive survey. For those who had published information about a CIS, the data were extracted from the reference and the survey was completed with the available information. The pre-filled survey was then sent to the respondents who were then asked to fill in any gaps or add further comments.

The general questionnaire is contained in Appendix B.

Results

1. General description

We identified 12 CISs that met our definition. Most were experimental (with limited funding designed with evaluation rather than long-term service in mind). Four are still running.

Name of Service	Reference
'Hayward"	(Hayward et al., 1999)
QUEST	(Del Mar, Silagy et al., 2001)
AQUA	(Del Mar, Silagy et al., 2001)
EBM Fellow	(Coulthard & Callaghan, 2001)
Clinical Evidence Researcher Service (CERS)	Survey
Joanna Briggs Institute (JBI)	Survey
Imperial College Clinical Informaticist Project	(Greenhalgh et al., 2002; Swinglehurst, Pierce, & Fuller, 2001)
ATTRACT	(Brassey et al., 2001)
Merline GP Information (Merlin)	(Walton, Henderson, Hollings, & Lawrenson, 2000?)
Clinical Effectiveness Enquiry Service (CEES)	Survey
'Charite'	(Juche, Euler, Bruggenjurgen, Willich, & Kunz, 2002)
New Zealand Health Technology Assessment Unit (NZHTA)	Survey

The distribution is interesting:

Country	Number of services
Australia	6
UK	4
New Zealand	1
Germany	1

This may reflect a bias in identifying services. However we took steps to avoid 'missing' any.

Funding came mostly from government health services. In one case funding came form one country (UK) to Australia (Del Mar, Silagy et al., 2001) for part of the service.

Users were mostly primary care doctors (general practitioners). However also hospital paediatricians, other hospital clinicians, nurses, and allied health professionals were users. Users were offered training in the use of evidence-

based practice in the majority.

A mixture of clinicians, other scientists and librarians, most of who were specially trained, ran the services.

The material was reported back in a variety of ways, usually in summary form, describing the search strategy, and sometimes providing the references, as well as a summary of the findings. Six services provided a summary of reports as an electronic bank for others to use.

Formal evaluation was undertaken by 10 services, all of which reported users self-reported changes in clinical management, as well as general satisfaction. About half of the possible users actually used the service at least once, among those 8 services that could estimate the denominator of potential users. There was a crude range of 1-125 person-days to answer one question, the modal range being about 2-3. This translates into a crude estimate of typically 20 person-days from the service to change a singe clinical decision.

Do clinical information services improve the use of evidence in clinical practice?

Published papers have not reported whether people are more likely to use evidence in practice if a CIS is available. The only way to answer this question would be to survey the actual people who have access to such a service, not only those who are using it.

For those who have access to a CIS, there are two subsidiary questions:

- Do people with access to a CIS use it?

About half of the possible users actually used the service at least once, among those 8 services that could estimate the denominator of potential users. Since in many cases the users were self-selected, or selected in some other way by interest or skill, it is likely that the proportion of users would be smaller.

There was a crude range of 1-125 person-days to answer one question, the modal range being about 2-3. This translates into a crude estimate of typically 20 person-days from the service to change a singe clinical decision.

- Does use of a CIS change clinical behaviour?

Only self-report is available, and probably biased towards those who asked questions. But adding up those who said they were influenced at least to some extent towards a change in clinical decision and the denominators, about half said they were influenced.

2. Who were served by the CISs?

The predominant consumers of the services were GPs but also included other clinicians, specialists, nurses and allied health professionals. Some were clearly aimed at one clinical group. For example, the Joanna Briggs Institute is focused on nurses. Another service called an EBM Fellow was located within a children's hospital. It was available to registrars and consultants but excluded surgical staff.

Generally, users of the services had no formal training in evidence-based medicine or critical appraisal. An exception was the QUEST service where all participating GPs had done an EBM workshop previously. Some services tried to assist the users, particularly in the formulation of questions, but this remained largely informal. Some institutions provided training in EBM or other library courses but these were not part of the service.

The majority of services were funded. Some services were pilot schemes designed to operate for a limited time, for example a service in Adelaide (Hayward, et al, 1999) and one in Berlin (Juche et al., 2002).

The staff employed in the services ranged from one part-time to a staff of 12 equivalent full-time people (NZHTA). In the case of *Merlin GP Information* 4 staff

were employed: a GP, clinical manager, a consultant in public health medicine and a public health information specialist. However, the Merlin team was only engaged in the service for about one day per week.

3. Searching Process

The turn around time (i.e. the time from receipt of question to dispatch of answer) varied markedly among the services from hours to a fortnight (the cut-off used in our definition). Services for GPs generally aimed to answer questions in under a week or so. Some services, such as ATTRACT, EBM Fellow, *Charite* and CERS succeeded in having answers dispatched within a day. Most services would respond to urgent requests, which were dealt with more promptly than 'regular' requests.

A number of services reported that they had to go back to the person requesting information for clarification of the question. This would, of course, have delayed response intervals. Two services (Hayward and QUEST) reported the time it took to research the answer to the question, which was, on average, a few hours. Del Mar reported that the average time was 3 hours 32 minutes and the maximum amount of time spent on one question was 23 hours 30 minutes.

Most services had various modes for receipt of questions which included post, phone, fax, email, website, in person and even pathology courier (QUEST).

Most of the services had medically trained staff (including GPs and nurses) with training in EBM. A few services had research assistant staff and/or librarians. The Merlin service reported a process of searching and preliminary appraisal by the informaticist with the appraisal completed by a consultant in public health medicine. The final response was also checked by a GP for clinical relevance before being sent out to the requester. It seemed that many of the services were run on part-time basis with varying inputs from different staff. One service with 12 equivalent full-time staff (NZHTA) had staff trained in all aspects mentioned.

All but one service reported a formal and explicit search cascade for literature searching. The SEQS service reported no formal cascade search technique. Most search cascades involved Cochrane Library (CL; including the Database of Abstracts of Reviews of Evidence, DARE), Clinical Evidence (CE), Best Evidence (BE), PubMed (Clinical Queries; CQ), ACP Journal Club (ACP); TRIP and other assorted databases and EBM websites. Some services also consulted pharmaceutical information sources, guidelines and textbooks.

The majority of services offered literature at only the highest level of evidence. For example, if there was a Cochrane Review regarding a particular question then there was no further searching done. Some services provided evidence at all levels but one service indicated that what it provided depended on what the client requested (NZHTA).

4. Service Output

All but one service provided a summary of the research findings and critical appraisal of the literature. The exception was the Clinical Effectiveness Enquiry Service in London, which was essentially a Clinical Librarian Service. Most services made available the search strategy, the abstracts of references and/or a list of references. Some services gave an appraisal of validity, applicability and strength of evidence (Hayward and Charite).

Eight out the 13 services attempted to 'reuse' the information from the answered questions for the wider use of interested parties. Six of the services used a website with two more planning to use one in the future. One service used a local intranet website. The other main avenues of dissemination of findings were newsletters or copies to others on ward rounds (CERS)

5. Evaluation

All but one of the services had been formally evaluated. Nine of these evaluations had been published. The CERS service will be evaluated in January 2003.

The number of consumers that each service was available to varied considerably from 31 GPs in the QUEST service to approximately 1700 GPs in Wales (ATTRACT) and an unknown clientele for the NZHTA. This service is available to any non-client staff willing to pay the fee for information. It appeared that all other services were offered freely. Indeed, a service may have been offered in a particular health setting (e.g. hospital, primary care district, etc) so it was hard to gauge exactly how many potential consumers there were.

The actual use of the services by potential consumers was also difficult to ascertain in some cases. Some services were able to report both the potential consumers and the actual users. The approximate use ranged from 2.3% of clinicians (Charite) to nearly two-thirds (EBM Fellow, ICCIP and Merlin). In general, however, the use of the services was rather low given the potential consumer base.

Some services asked consumers about the impact of the service. Those who were surveyed indicated that, overall, the service was useful, quick, of sufficient quality and would be used again. The possibly more important indicator was whether use of the service had influenced clinical management. Nine services evaluated this aspect. Some consumers indicated that the answer changed their clinical practice or confirmed their current practice.

6. Other Aspects

6.1 Types of question

Some services evaluated the types of questions that were posted (Table 2). The experiences among the different services were similar: the majority (55.6%) were intervention questions ('treatment' and 'therapy'); 12.6% were diagnostic and screening questions; 8.5% were aetiological; and only 2.6% were prognostic; (20.6% were 'other').

6.2 Proportion of questions that could be answered

Some services also provided data that enabled an estimate of the number questions answered to be made (Table 3). Most questions (83%) could be answered.

6.3 Quality of the evidence

One service provided a classification of the strength of the evidence for its service's answers. Most questions (47%) yielded 'limited' or 'weak' evidence only, and only 41% 'high quality' or 'moderate' (Table 4). Another service (Charite) also rated evidence sources.

6.4 Person time

It is of interest to estimate the human resource required to provide such services. To this end we undertook estimates to the extent the data allowed. We undertook this by the following formula:

(Duration x no. of staff x staff involvement) / no. of questions

For example, for Merlin, this was

5 years (5 x 365 days) x 4 staff x 0.2 (1 day/week) / 500 questions = 2.92 person days/question

We have crudely tabulated this in Table 5.
In addition it is possible to estimate the human resources required to change a single clinical decision

(Duration x no. of staff x staff involvement) / no. of altered decisions

This is also tabulated, Table 10.

Question 2

How widespread are clinical information services?

There were six services reported within Australia. Two are ongoing in Adelaide: the first a NICS funded project – Clinical Evidence Researcher Service; the other at the Joanna Briggs Institute, which aims to foster a collaborative approach to the evaluation of research and integration into nursing practice.

Seven overseas services were identified: four in the UK; one in Germany; and one in New Zealand. Two ran for 2-4 years. Four are currently running.

This seems a modest level of service for the world.

There are, of course, probably many clinical library services, but that was outside the scope of this review.

Question 3

Do clinical information services change practitioners' clinical decisions and management?

To answer this question adequately, a study would need to measure patient outcomes, or at least measure clinical behaviour directly. However, the only outcomes that attempted this have looked at self-reported behaviour by the users of the service. These have reported changes in behaviour (Table 9).

One interesting finding was that the services were often used to *confirm* rather than simply provide new information. Thus one outcome of such services may be in the greater confidence clinicians have in their use of information and knowledge about decisions.

Independent evaluation of the services' questions were made in some services: these confirmed that some questions were highly relevant to other clinicians (that is, were not so specific as be not useful to others).

Many services used their answers so that others could make use of them. Clearly there is great potential for a very much greater number of people to be influenced. There seems to be little evaluation of this aspect of use, however.

Other services outside the scope of this review

A number of other clinical information services were found during the course of this review. However, each failed to meet all of the three criteria required for inclusion in this review. For the sake of completeness, we have noted these as 'excluded studies'. The details are summarized In Table 11.

1. Centre for Clinical Effectiveness (Australia)

Monash University, Melbourne

This service was established by the CCE in conjunction with the Southern Healthcare Network in Melbourne as an "evidence centre". Hospital clinicians and policy makers submit queries in a structured format with four grades of service available (Anderson, Burrows, Fennessy, & Shaw, 1999).

Reason for Exclusion: This service provided four grades of service for evidence requests, ranging from a literature search restricted to electronic information sources (1-2 weeks) to a complete topic review (8-12 weeks). The topic review systematically retrieved relevant articles, critically appraised them and then provided a detailed report of the findings. Although the literature search service is within the time frame for this review, it was not clear that evidence from the literature review was critically appraised (as per the complete topic review).

2. Clinical Enquiry Service (UK)

Faculty of Family Planning and Reproductive Health Care; Royal College of Obstetricians and Gynaecologists, UK

The CES for faculty members and diplomates will be based on a structured evidence-based approach that aims to give a clear answer to the question and inform members on the process of developing the answer.

Reason for Exclusion: To our knowledge, this service is not yet running. In addition, it appears that the service will only be for members of the faculty and hence most questions will be concerned with contraceptives and reproductive health.

3. Clinical Informatics Consult Service (US)

Vanderbilt University Medical Centre, Tennessee

This program is based in a university medical centre and brings information specialists directly into the clinical intensive care setting, where they provide just-in-time, patient-specific information. In response to questions from clinical teams, CICS librarians provide searching and synthesis of the literature that may

take up to several hours to complete.

Reason for Exclusion: There was no published information on this service and we were unable to elicit a response to the survey despite a number of attempts. Information contained in Table 11 was extracted from information at the website.

4. Doctorline (Italy)

Doctorline is an independent, unbiased, toll-free medical information service that provides information on clinical, pharmacologic, and toxicologic issues; bibliographic searches; full-text articles; public and private clinics; details of forthcoming congresses; and legislative documentation. Staff members are physicians trained in communication techniques, literature evaluation methodologies, and computerized database use (Nobili et al., 1998).

Reason for Exclusion: Could not ascertain whether the information was critically appraised before it was delivered to consumers either online or offline.

5. South Essex Question Service (UK)

Individual nurses and doctors working in primary care were approached, encouraged to think about their clinical behaviour and to identify topics where they thought they might like to have more evidence wither to justify their current clinical practice or to stimulate change. The personal approach was labour-intensive but seemed to provide a good yield in questions. The project took two years and the informaticists have tackled over 125 topics.

Reason for Exclusion: This service fitted two of the criteria but the turn around time was in excess of our cut-off of ≤ 14 days. This service aimed for a turn around time of a month but initially took 2-3 months. This service was published alone (Martin & Kauser, 2001) and also compared against the ICCCIP project in a published paper (Greenhalgh et al., 2002; Martin & Kauser, 2001) .

Table 1. Summary of the search of the electronic databases

Step in process	Medline	CINAHL	APAIS-Health	AMI	EMBASE	Cochrane Library
Potentially relevant identified and screened	1459	636	7	117	298	128
Citations excluded after the title/abstract reviewed	1427	607	7	116	298	127
Citations excluded after the full text reviewed	27	28	0	1	0	1
Studies included in the review	5	1 [a]	0	0	0	0
TOTAL	5					

[a] This article was already found in Medline.

Table 2. Classification of clinical questions answered by different services

Service	Treatment / Therapy	Aetiology	Prognosis	Diagnosis & Screening	Other	Total
QUEST/AQUA	104	27	21	8		160
Hayward	32	1	3	9		45
ATTRACT	124	5	0	15	49 [a]	193
Imperial College	40	6	0	14		60
Juche	24	3	2	1	1 [b]	31
Merlin	222	42	0	78	154 [c]	500
Pooled	550	84	26	125	204	989
Pooled (%)	***55.6***	***8.5***	***2.6***	***12.6***	***20.6***	***100***

[a] Other included: harm (23), general, organizational and guidelines

b Side effects

c General information, risks/associations (non-drug), alternative therapies, non-clinical, cost-effectiveness/rationing and evidence base for time honoured practices.

Table 3. Proportion of questions that were answered by service

Service	Total number of Questions	Could be answered, or evidence found	Percent
Quest	116	85	73%
AQUA	44	37	84%
ICCIP	60	57	95%
'Charite'	34	31	91%
Total	**254**	**210**	**83%**

Table 4. Hayward's classification of evidence sources

Grade	Description	No. of sources
****	High quality	3
***	Moderate	21
**	Limited	18
*	Weak	10
NR	Not Rated	7
Total		59

(Also 'Charite' rated evidence sources)

Table 5. General aspects of clinical information services

Name of service	Information Source	Location	Date of operation	No. of staff	Funding	Funding Source
'Hayward'	Reference	Adelaide	Nov-98 (1 month)	2 GPs and 1 info. specialist	Yes	UK/NHS
QUEST	Reference and Personal Communication	Queensland	Feb - Oct 1999 (9 months)	1 Research Assistant	Yes	Commonwealth Government of Australia
AQUA	Reference and Personal Communication	Victoria	Feb - Oct 1999 (9 months)	1 Research Assistant	Yes	Commonwealth Government of Australia
EBM Fellow	Ref and Survey	Royal Children's Hospital, Brisbane	May 1999 - Nov 1999	1	Yes	RCH Clinical Research Fellowship
Clinical Evidence Researcher Service (CERS)	Survey	Daw Park, Adelaide	July 2002 – January 2003	0.5	Yes	National Institute of Clinical Studies (Australia)
Joanna Briggs Institute (JBI)	Survey	Adelaide	07/97 – present	4	Yes	Membership
Imperial College clinical informaticist project (ICCIP)	Reference and Survey	London: 2 1o care groups Fulham and Hammersmith	11/98 - 10/00	1.5	Yes	NHS Executive
ATTRACT	Reference Reference and Survey	Wales	01/97 - present	2.5	Yes	Primary care Budget
Merlin GP Information (Merlin)	Ref and Survey	East Surrey Health Authority	10/96 -2002	4	Yes	East Surrey & Regional Health Authorities
Clinical Effectiveness Enquiry Service (CEES)	Survey	London (Royal Free & Univ. College medical School)	04/02 - ongoing	1	Yes	NHS
'Charite'	Reference	Charite Medical Centre, Berlin	08/01 -12/01 (6 weeks?)	2	Not stated	Not stated
NZ Health Technology Assessment Unit (NZHTA)	Survey	Christchurch, NZ	06/97 - present	12 EFT	Yes	NZ Ministry of Health (1o source)

Table 6. User aspects of clinical information services

Name of service	Users of service	Were users trained in evidence-based practice?
'Hayward'	GPs	No
QUEST	GPs after EBM workshop	Yes
AQUA	GPs in 2 divisions of GP	No
EBM Fellow	Registrars & Consultants (not surgical staff)	No formal training (some advice on framing questions)
CERS	Clinicians; Specialists - any doctor associated with Repat Gen Hospital Depts of Resp Med; Sleep Disorders, Rheumatology	No
JBI	Clinicians; Specialists; Nurses; Midwives; Allied Health Profs	Yes: workshops on clinical effectiveness
ICCIP	GPs nurses, allied health	Yes: some help to formulate questions
ATTRACT	GPs, nurses, Allied Health	No, not as part of service
Merlin	GPs, nurses, public health nurses, Allied health	
CEES	GPs, clinicians, nurses, allied health: all Hampstead NHS staff	Yes; question formulation; Library courses available
'Charite'	Clinicians; specialists	No
NZHTA	GPs; nurses; clinicians; allied health; non-clients for fee	Yes; training workshops available

Table 7. Searching process and other aspects of clinical information services

Name of service	Time to research	Turn around time	Question delivery	Training of staff	Search cascade	Level of evidence
'Hayward"	2.5h (1.0-7.4)	3 days (1 - 12)	Post/fax/email/	2 GPs with training in critical appraisal; 1 info. specialist	CL, BE, Primary literature search	Highest only
QUEST	3 h 32 m (2.67 - 3.97)	1 week (urgent more quickly)	Fax/email/Pathology courier then fax/phone/in person	BSc (Pod), Training in searching & critical appraisal	PubMed (CQ), Medline, CL, SUMsearch, BE, Inforetriever, CATbank, Bandolier	Highest level only
AQUA	3 h 32 m (2.67 - 3.97)	1 week (urgent more quickly)	Fax/email	BSc, GradDipLIS	PubMed (CQ), Medline, CL, SUMsearch, BE, Inforetriever, CATbank, Bandolier	Highest level only
EBM Fellow	3.1 ± 1.65 h		Request form (in person?)	Medical: trained in information retrieval	CL, BE, PubMed (CQ)	All levels
CERS		~24 hours	In person on wards rounds (majority) phone; email	Librarian; EBM (MPH)	CE, UpToDate, ACP, CL, PubMed (CQ), NGC, Medline, Embase, etc	Highest level
JBI		2 weeks	Phone/email/in person	Nursing; EBM	Yes	Highest Level
ICCIP	130 min (25-450)	9 days	Phone; fax; email; post	Medical, EBM	CL, BE, TRIP, Bandolier, CE, EBM websites, Medline, other	Highest
ATTRACT		3 levels: =6h, 2-3 days, 5-10 days	Phone; fax; email; post; website	Nursing, Librarian EBM	CL, TRIP, CE, PubMed, Embase, Google	All levels
Merlin		8.5 days (~6/week) (1 day/ week)	Phone; Fax; email; post	Medical, EBM	CL, TRIP, Medline, Embase, other EBM sites, Guidelines, Textbooks	Highest level
CEES		2 days (urgent/non-urgent)	Phone; fax; email; post; in person	Librarian, EBM	CE, CL, PubMed (CQ), TRIP	All levels
'Charite'		7 h (3-32)	Email	Medical; EBM	CE, CL, ACP, TRIP, PubMed	Not stated
NZHTA		Hours-weeks: depends on complexity of request	Phone; fax; email; post; in person	Medical, Nursing, Librarian, EBM and other*	Medline, CL, Embase, PubMed, CC, Web of Science	All - depends on clients

Table 8. Output aspects of clinical information services

Name of service	Summary of results	Format of report	Reuse of information
'Hayward'	Yes	Narrative, citations, appraisal of validity, applicability, strength (1-4*)	No
QUEST	Yes	Comment, applicability, quality of evidence, search strategy, abstracts of citations	Yes, Website at each site - CAT bank
AQUA	Yes	Comment, applicability, quality of evidence, search strategy, abstracts of citations	Yes, Website at each site - CAT bank
EBM Fellow	Yes	Summary, search strategy, abstracts of citations	No
CERS	Yes	Summary, references	No, permission sought for website; copies to group on ward rounds
JBI	Yes	Summary, search strategy, references, data extract or synthesis or meta-analysis	Website, CAT bank, incorporated into Practice Manual Development
ICCIP	Yes	Summary, references	Project website, newsletter
ATTRACT	Yes and crude appraisal	Written summary and references (search strategy via website)	Yes: Websites: BMJ & ATTRACT;Newsletter
Merlin	Yes	Written summary, reference list	CAT bank; Local intranet; website in future
CEES	No	Search Strategy, references (Print and email, full text if electronic)	No
'Charite'	Yes	Summary, appraisal, search strategy, original question, classification. of evidence	Not stated
NZHTA	Yes	Summary, search strategy, references, (other depends on client)	Website, newsletter, hard copies available for purchase

Table 9. Evaluation aspects of clinical information services

Name of service	Formal evaluation	Ref	No. available to	No. used service	No. questions	Impact of service	Influence clinical management	Clinical relevance of questions
'Hayward'	8/21; 1 declined	Y	31	9	20 enquiries 45 questions	Useful in CDM	4/20 alter patient management	NA
QUEST	73% response rate	Y	71	41	116	Reliable, prompt, easy to use, influential	15/26 directly changed,10/26 confirmed	6 high, 13 moderate, 1 not relevant
AQUA	76% rr	Y	17?	17	44	See QUEST (same evaluation)	See QUEST	See QUEST
EBM Fellow	26/33= 79%	Y	~ 50 people	33 (9 used > once)	41	Mean user satisfaction 8.4/10	5/26 changed, 19/26 confirmed	No
CERS	January 2003	N	All doctors at RGH	Not evaluated yet	Not evaluated yet		Feedback sheet each response- ~100% return	Independent random audit of quality of responses currently
JBI	No	N	All members: corporate, individuals	20-30 per year	20-30 per year		Yes	No
ICCIP	17/22 = 77%	Y	100 invited, 34 registered	22	60		15/54 change; 29/54 will change for others	Yes
ATTRACT	42/50 = 84%	Y	~1700 GPs (~500 practices): GPs 90% queries	~1/3 of practices	193 in 13 months; ~15-20/week	Useful, quick, would use again	24/42 changed practices; 9/42 confirmed	Not evaluated
Merlin	34/139 enquirers = 24%	Y	225 GPs (1996-2000)	139	500 (96% from GPs)	Good or adequate quality	32% change greatly; 54% change to some extent	Not stated
CEES	Yes	N	Unknown	~85 at 10/02	162 (1.4.02 - 31.10.02)		Not evaluated	Not evaluated
'Charite'	Yes	Y	All clinicians at a university hospital	2.3% of clinicians	34	Answers were good, comprehensible and transparent	No; minimally or not at all	Not stated
NZHTA	Yes (internal by NZ MoH)	N	NZ health professionals; purchasers; policy makers	Unknown	30-40 in depth/year, other reference enquiries		Yes	Not evaluated

Table 10. Efficiency and other aspects of clinical information services

Name of service	Duration (days)	No. of questions	Person days /question	Person days/ altered decision	Other aspects
'Hayward'	1 month (30 days)	45	2	8 (4/20)	
QUEST	9x 30.4 days = 274	116	2	18 (15/26)	Concordance of answers between 2 services
AQUA	9x 30.4 days = 274	44	6	NA	Concordance of answers between 2 services
EBM Fellow	7 x 30.4 = 213 days	41	5	43 (5/26)	Critical appraisal journal club - CAT bank on website
CERS	7 x 30.4 days	Not evaluated yet	NA	NA	
JBI	5 years, 3 mo = 1916 days	20-30 per year (131)	59	NA	
ICCIP	23 months = 700 days	60	18	47 (15/54)	
ATTRACT	13 mo x 30.4 = 395 days	193 in 13 months;	5	16 (24/42)	
Merlin	5 years x 365 = 1825 days	500	3	**42** (44/139 enquirers = 32%) change greatly; **24** (75/139 = 54%) change some extent; **15** (119/139) any change	
CEES	7 months x 30.4 = 213 days	162 (1.4.02 – 31.10.02)	1	Not evaluated	
'Charite'	6 weeks x 7 = 42 days	34	3	No; minimally or not at all	
NZHTA	5 years, 4 mo = 1947 days	30-40/year, (187)	125	Yes	

NA – Not available

Table 11. Summary of characteristics of excluded services

Name of service	Centre for Clinical Effectiveness	Clinical Enquiry Service	Clinical Informatics Consult Service	Doctorline	South Essex Question Service
1. General Aspects					
Source	Reference	Website	Website, survey – no response	Reference	Ref and Survey
Location	Melbourne & Southern Healthcare Network	FFPRHC; FROG - UK	Vanderbilt University Tennessee, US	Italy	South Essex (3 cities ~ 700 000 population
Date of operation	April 98 – present	Current	Current	1991 – present (?)	12/98 - present
No. of staff	(3 + 0.5 director) x 0.45	Not stated	7	17 part-time (12 h/wk each), 1 full-time director	0.4 GP, 0.2 nurse
Funding	Yes	Assumed	Not stated	Yes	Yes
Funding Source	Hospital, state, external, contracts	FFPRHC, RCOG	Not stated	Pharmaceutical companies - but independent advice	Local health IT implementation funds (ends 04/03)
2. Consumers					
Users of service	SHN hospital clinicians and policy makers	Members and diplomats, FFPRHC	Clinical teams Vanderbilt University	GPs, specialists, hospital physicians, pharmacists, librarians	Mostly GPs – All primary care workers including administrators
Users trained in EBM	No	Aim to inform members on process of developing an answer	No. Aim to make local users proficient.	No	No. Aim to make users proficient. Local courses available.
3. Searching process					
Turn around time	1-2 weeks (lit review)	7 days during development phase; aim for 48-72 h in early 2003	Several hours	Online telephone or off-line – further searching	Aim for 1 month (initially 2-3 mo)
Question delivery	Structured format	Telephone, fax, email, post	Not stated	Toll-free telephone	Post; website
Training of staff	All literature searching others: clinical, IT, epidemiology, etc	Not stated	Information specialists (clinical library)	Clinical, specific training for service – up to 9 weeks	GPs, Nurses, Librarians

…continued

Table 11. Summary of characteristics of excluded services, continued

Name of service	Centre for Clinical Effectiveness	Clinical Enquiry Service	Clinical Informatics Consult Service	Doctorline	South Essex Question Service (Basildon)
Search cascade	BE, CL, PubMed, PychInfor, HealthSTAR, Embase, other websites	Evidence based search	RCTs; prospective controlled studies; guidelines;	Online: Medline, Micromedix CCIS Offline- bibliographic search (sent email/fax)	No formal
Level of evidence	Highest	Not stated	Not stated	Highest	All levels
4. Output Appraisal					
Summary of results	Yes	Yes	Yes	Not clearly stated	Yes
Format of report	Literature search restricted to electronic information sources	Not stated	Concise written summary, references	Online – answer Offline – search	Summary, appraisal, list of references
Reuse of information	Website	Website	Website and updated every 6 months	No. Questions filed for database management	Newsletter, now website
5. Evaluation					
Formal evaluation	86% response rate, first 11 months	Not stated	Not stated	Yes	Yes
Published	Anderson et al, 1999		Not stated	Ref # x	Ref # x
No. available to	SHN staff	Members and Diplomates of FFPRHC, RCOG, UK.	Clinical teams Vanderbilt University Medical Centre	52 181 during Jan 94 – Dec 96	150+ practices
No. used service	Not stated	Not stated	Not stated	8817 (16.9%); 34% GPs	~100
No. questions	59 completed out of 77 requests	Not stated	Not stated	65 258 for 1991-1996, 46 per day	~250
Impact of service	Users satisfied with information and timeliness, repeat business.	Not stated	Not stated	Not evaluated. Future direction.	
Influence clinical management	4/18 likely, 11/18 very likely to alter future practice	Not stated	Not stated	Not evaluated. Future direction.	Not evaluated, now ask it
Evaluation of clinical relevance of questions	No	Not stated	Not stated	Quality control of random sample of on- and off-line answers.	Not stated
6. Other	4 grades of service: complete topic review (8-12 wks)			Independent from sponsors	

Glossary

ACP	ACP Journal Club
AQUA	All Questions Answered
ATTRACT	Ask TRIP To Rapidly Alleviate Confused Thoughts
BE	Best Evidence
CC	Current Contents
CDM	Clinical Decision Making
CE	Clinical Evidence
CIS	Clinical Information Service
CL	Cochrane Library
CQ	Clinical Queries (PubMed)
EBM	Evidence-Based Medicine
EBP	Evidence-Based Practice
NA	Not Available
QUEST	Queensland University Evidence Search Trial
RCT	Randomised Controlled Trial
TRIP	Turning Research Into Practice

References and Reports

Included Clinical Information Services

'Hayward':

1. Hayward, J. A., Wearne, S. M., Middleton, P. F., Silagy, C. A., Weller, D. P., & Doust, J. A. (1999). Providing evidence-based answers to clinical questions. A pilot information service for general practitioners. Med J Aust, 171(10), 547-550.
2. Survey sent – no response.

QUEST:

1. Del Mar, C. B., Silagy, C. A., Glasziou, P. P., Weller, D., Spinks, A. B., Bernath, V., Anderson, J. N., Hilton, D. J., & Sanders, S. L. (2001). Feasibility of an evidence-based literature search service for general practitioners. Med J Aust, 175(3), 134-137.
2. Personal Communication

AQUA:

1. Del Mar, C. B., Silagy, C. A., Glasziou, P. P., Weller, D., Spinks, A. B., Bernath, V., Anderson, J. N., Hilton, D. J., & Sanders, S. L. (2001). Feasibility of an evidence-based literature search service for general practitioners. Med J Aust, 175(3), 134-137
2. Personal Communication

EBM Fellow:

1. Coulthard, M. G., & Callaghan, L. A. (2001). An evidence-based medicine fellowship in a children's teaching hospital. J Qual Clin Pract, 21(4), 126-130.
2. Survey

Clinical Evidence Researcher Service (CERS):

1. Survey - Ruth Sladek

Joanna Briggs Institute (JBI):

1. Survey - Craig Lockwood

Imperial College Clinical Informaticist Project (ICCIP):

1. Swinglehurst, D. A., Pierce, M., & Fuller, J. C. (2001). A clinical informaticist to support primary care decision making. Qual Health Care, 10(4), 245-249.
2. Greenhalgh, T., Hughes, J., Humphrey, C., Rogers, S., Swinglehurst, D., & Martin, P. (2002). A comparative case study of two models of a clinical informaticist service. BMJ, 324(7336), 524-529.
3. Survey – T Greenhalgh, D. Swinglehurst
4. Martin, P., & Kauser, A. (2001). An informaticist working in primary care: a descriptive study. Health Informatics Journal, 7(2): 66-70

ATTRACT:

1. Brassey, J., Elwyn, G., Price, C., & Kinnersley, P. (2001). Just in time information for clinicians: a questionnaire evaluation of the ATTRACT project. Bmj, 322(7285), 529-530.
2. Survey

Merlin GP Information:

1. Walton, J., Henderson, G., Hollings, A., & Lawrenson, R. A rapid review service for general practitioners' - what questions do GPs ask? International Journal of Family Medical Practice and Primary Care, URL: http://www.priory.com/fam/whatgpswant.htm (Accessed 30th October 2002)
2. Survey

Clinical Effectiveness Enquiry Service (CEES):

1. Survey – Laura Tucker

'*Charite':*

1. Juche, A., Euler, U., Bruggenjurgen, B., Willich, S. N., & Kunz, R. (2002). External research service with critical appraisal of the medical literature at a university medical centre. Qual Saf Health Care, 11(3), 297.
2. Survey sent – no response.

New Zealand Health Technology Assessment Unit (NZHTA):

1. Survey – Ray Kirk

Excluded Clinical Information Services

1. Centre for Clinical Effectiveness (Australia):
Anderson, J., Burrows, E., Fennessy, P., & Shaw, S. (1999). An "evidence centre" in a general hospital: finding and evaluating the best available evidence for clinicians. *Evidence-Based Medicine, 4*, 102-103.
URL: http://www.med.monash.edu.au/healthservices/cce/about/ (Accessed 11.12.02)

2. Clinical Enquiry Service – Faculty of Family Planning and Reproductive Health Care; Royal College of Obstetricians and Gynaecologists, UK:
URL: http://www.ffprhc.org.uk/clinical_effect/q_and_a.html (Accessed 11.12.02)

3. Clinical Informatics Consult Service (US)
URL: http://www.mc.vanderbilt.edu/biolib/services/cics.html (Accessed 11.12.02)

4. Doctorline (Italy):
Nobili, A., Gebru, F., Rossetti, A., Schettino, F., Zahn, R. W., Nicolis, E., Macario, G., Celani, L., Acik, V. O., Farina, M., & Naldi, L. (1998). Doctorline: a private toll-free telephone medical information service. Five years of activity: old problems and new perspectives. *Ann Pharmacother*, 32(1), 120-125.

5. South Essex Question Service (UK):

1. Martin, P., & Kauser, A. (2001). An informaticist working in primary care: a descriptive study. Health Informatics Journal, 7(2), 66-70

2. Greenhalgh, T., Hughes, J., Humphrey, C., Rogers, S., Swinglehurst, D., & Martin, P. (2002). A comparative case study of two models of a clinical informaticist service. *Bmj*, 324(7336), 524-529.
3. Survey.

Doctorline (Italy):
Nobili, A., Gebru, F., Rossetti, A., Schettino, F., Zahn, R. W., Nicolis, E., Macario, G., Celani, L., Acik, V. O., Farina, M., & Naldi, L. (1998). Doctorline: a private toll-free telephone medical information service. Five years of activity: old problems and new perspectives. *Ann Pharmacother*, 32(1), 120-125.

All Published References

Anderson, J., Burrows, E., Fennessy, P., & Shaw, S. (1999). An "evidence centre" in a general hospital: finding and evaluating the best available evidence for clinicians. *Evidence-Based Medicine, 4*, 102-103.

Brassey, J., Elwyn, G., Price, C., & Kinnersley, P. (2001). Just in time information for clinicians: a questionnaire evaluation of the ATTRACT project. *Bmj, 322*(7285), 529-530.

Coulthard, M. G., & Callaghan, L. A. (2001). An evidence-based medicine fellowship in a children's teaching hospital. *J Qual Clin Pract, 21*(4), 126-130.

Davidoff, F., & Florance, V. (2000). The informationist: a new health profession? *Ann Intern Med, 132*(12), 996-998.

Del Mar, C. B., & Glasziou, P. P. (2001). Is coenzyme Q10 helpful for patients with idiopathic cardiomyopathy? Letter. *Med J Aust, 175*, 447-448.

Del Mar, C. B., & Glasziou, P. P. (2002). Is laser treatment effective and safe for musculoskeletal pain? [letter]. *Med J Aust, 176*(3), 195.

Del Mar, C. B., Glasziou, P. P., Spinks, A. B., & Sanders, S. L. (2001a). Does drinking carrot juice affect cancer of the prostate? *Med J Aust, 174*(4), 197.

Del Mar, C. B., Glasziou, P. P., Spinks, A. B., & Sanders, S. L. (2001b). Does drinking carrot juice affect cancer of the prostate? [letter]. *Med J Aust, 175*, 53-54.

Del Mar, C. B., Glasziou, P. P., Spinks, A. B., & Sanders, S. L. (2001c). Is coenzyme Q10 helpful for patients with idiopathic cardiomyopathy? *Med J Aust, 174*(8), 421.

Del Mar, C. B., Glasziou, P. P., Spinks, A. B., & Sanders, S. L. (2001d). Is isopropyl alcohol swabbing before injection really necessary? *Med J Aust, 174*(6), 306.

Del Mar, C. B., Glasziou, P. P., Spinks, A. B., & Sanders, S. L. (2001e). Is laser treatment effective and safe for musculoskeletal pain? *Med J Aust, 175*(3), 169.

Del Mar, C. B., Glasziou, P. P., Spinks, A. B., & Sanders, S. L. (2002). Natural remedies for osteoporosis in postmenopausal women. *Med J Aust, 176*, 182-183.

Del Mar, C. B., Glasziou, P. P., Spinks, A. B., Sanders, S. L., & Hilton, D. J. (2001). Treatment alternatives for nocturnal leg cramps. *Med J Aust, 174*(10), 540.

Del Mar, C. B., Glasziou, P. P., Spinks, A. B., Sanders, S. L., & Hilton, D. J. (2002). Safety of hormone replacement therapy after mastectomy. *Med J Aust, 176*(6), 285.

Del Mar, C. B., Silagy, C. A., Glasziou, P. P., Weller, D., Spinks, A. B., Bernath, V., Anderson, J. N., Hilton, D. J., & Sanders, S. L. (2001). Feasibility of an

evidence-based literature search service for general practitioners. *Med J Aust, 175*(3), 134-137.

Dodson, S. (1996). *Quality storybook (online). University of Washington Health Science Libraries.* [Website]. http://healthlinks.washington.edu/hsl/liaisons/dodson/storybook.html. Retrieved 16th December, 2002, from the World Wide Web:

Greenhalgh, T., Hughes, J., Humphrey, C., Rogers, S., Swinglehurst, D., & Martin, P. (2002). A comparative case study of two models of a clinical informaticist service. *Bmj, 324*(7336), 524-529.

Hayward, J. A., Wearne, S. M., Middleton, P. F., Silagy, C. A., Weller, D. P., & Doust, J. A. (1999). Providing evidence-based answers to clinical questions. A pilot information service for general practitioners. *Med J Aust, 171*(10), 547-550.

Honeybourne, C., & Ward, L. (2000). *Report of a six-month pilot project at Leicester General Hospital (Oct 1999- Mar 2000)[online]. University Hospital of Leicester NHS Trust. Education Centre Library, Leicester.* http:/www.le.ac.uk/li/lgh/library/clinlib.htm. Retrieved 16 December, 2002, from the World Wide Web:

Honeybourne, C., Ward, L., & Verschuere, J. (2002, 16-21 September 2002). *Clinical librarians bring the world of information to the patient's bedside: a UK experience.* Paper presented at the European Conference of Medical and Health Libraries URL: http://www.zbmed.de/eahil2002/proceedings/ward-proc.pdf (Accessed 11.11.02), Cologne.

Juche, A., Euler, U., Bruggenjurgen, B., Willich, S. N., & Kunz, R. (2002). External research service with critical appraisal of the medical literature at a university medical centre. *Qual Saf Health Care, 11*(3), 297.

Killingsworth, E. (2000). Evolution of clinical librarianship: adapting to a changing environment. *Journal of Educational Media and Library Services, 37*, 265-274.

Martin, P., & Kauser, A. (2001). An informaticist working in primary care: a descriptive study. *Health Informatics Journal, 7*(2), 66-70.

NHMRC. (2000). *How to put the evidence into practice: implementation and dissemination strategies.* Canberra: NHMRC.

Nobili, A., Gebru, F., Rossetti, A., Schettino, F., Zahn, R. W., Nicolis, E., Macario, G., Celani, L., Acik, V. O., Farina, M., & Naldi, L. (1998). Doctorline: a private toll-free telephone medical information service. Five years of activity: old problems and new perspectives. *Ann Pharmacother, 32*(1), 120-125.

Swinglehurst, D. A., Pierce, M., & Fuller, J. C. (2001). A clinical informaticist to support primary care decision making. *Qual Health Care, 10*(4), 245-249.

Urquhart, C. J., & Davies, R. (1997). Assessing the impact of information on evidence-based nursing practice: the EVINCE (Establishing the Value of Information to Nursing Continuing Education) project. *Top Health Inf Manage, 18*(2), 53-63.

Walton, J., Henderson, G., Hollings, A., & Lawrenson, R. (2000?). A rapid review service for general practitioners' - what questions do GPs ask? *International Journal of Family Medical Practice and Primary Care, http://www.priory.com/fam/whatgpswant.htm*.

Ward, L. M., Honeybourne, C. J., & Harrison, J. (2001). A clinical librarian can support clinical governance. *British Journal of Clinical Governance, 6*(4), 248-251.

Winning, A., & Beverly, C. (2001, 3rd September 2001). *Clinical Librarianship: A Systematic Review.* Paper presented at the 1st Evidence Based Librarianship Conference, Sheffield.

Appendix A

Search Strategies

APAIS – Health (1995-)

- ((EVIDENCE-BASED) or (evidence or literature)) and ((INFORMATION-SERVICES) or (apprais* or summar* or distil*))
- (INFORMATION-SERVICES) or (apprais* or summar* or distil*)
- apprais* or summar* or distil*
- 'Information-Storage-and-Retrieval' / all subheadings
- 'Databases-Bibliographic' / all subheadings
- 'Decision-Support-Systems-Clinical' / all subheadings
- INFORMATION-SERVICES
- (EVIDENCE-BASED) or (evidence or literature)
- evidence or literature
- EVIDENCE-BASED

AMI (1995-)

- (("Evidence-Based-Medicine" / all subheadings) or (evidence or literature)) and (("Decision-Support-Techniques" / all subheadings) or ("Information-Services" / all subheadings) or ("Databases-Bibliographic" / all subheadings) or ((apprais* or summar* or distil*) and (PY=1995-2003))
- ("Decision-Support-Techniques" / all subheadings) or ("Information-Services" / all subheadings) or ("Databases-Bibliographic" / all subheadings) or ((apprais* or summar* or distil*)
- (apprais* or summar* or distil*)
- 'Databases-Bibliographic' / all subheadings
- 'Information-Services' / all subheadings
- 'Decision-Support-Techniques' / all subheadings
- ("Evidence-Based-Medicine" / all subheadings) or (evidence or literature)
- evidence or literature
- 'Evidence-Based-Medicine' / all subheadings

Medline (1995-)

- ((explode "Information-Services" / organization-and-administration ,supply-and-distribution ,utilization in MIME,MJME) or (INFORMATION-SERVICES) or (explode "Decision-Support-Systems-Clinical" / organization-and-administration ,utilization in MIME,MJME) or (INFORMATION-STORAGE-AND-RETRIEVAL) or (explode "Databases-Bibliographic" / utilization in MIME,MJME) or (QUALITY-ASSURANCE-HEALTH-CARE)) and ((literature or evidence) or ("Evidence-Based-Medicine" / all subheadings in MIME,MJME))
- ((literature or evidence) or ("Evidence-Based-Medicine" / all subheadings in MIME,MJME))
- (explode "Information-Services" / organization-and-administration ,supply-and-distribution ,utilization i n MIME,MJME) or (INFORMATION-SERVICES) or (explode "Decision-Support-Systems-Clinical" / organization-and-administration ,utilization in MIME,MJME) or (INFORMATION-STORAGE-AND-RETRIEVAL) or (explode "Databases-Bibliographic" / utilization in MIME,MJME) or (QUALITY-ASSURANCE-HEALTH-CARE)
- 'Evidence-Based-Medicine' / all subheadings in MIME,MJME

- (literature or evidence)
- (apprais* or summar* or distil* or recommend* or assess*)
- (quer* or question or questions)
- QUALITY-ASSURANCE-HEALTH-CARE
- explode 'Databases-Bibliographic' / utilization in MIME,MJME
- INFORMATION-STORAGE-AND-RETRIEVAL
- explode 'Decision-Support-Systems-Clinical' / organization-and-administration ,utilization in MIME,MJME
- INFORMATION-SERVICES
- explode 'Information-Services' / organization-and-administration ,supply-and-distribution ,utilization in MIME,MJME

CINAHL (1995-)

- ((quer* or question or questions) or (appraise* or summar* or distil*) or DECISION-MAKING-PATIENT or DECISION-MAKING-CLINICAL or INFORMATION-SERVICES) and (explode 'Professional-Practice-Evidence-Based' / all topical subheadings / all age subheadings in DE)
- ((explode 'Professional-Practice-Evidence-Based' / all topical subheadings / all age subheadings in DE) or evidence)
- evidence
- (explode 'Professional-Practice-Evidence-Based' / all topical subheadings / all age subheadings in DE)
- (quer* or question or questions) or ((appraise* or summar* or distil*) or DECISION-MAKING-PATIENT or DECISION-MAKING-CLINICAL or INFORMATION-SERVICES)
- INFORMATION-SERVICES
- DECISION-MAKING-CLINICAL
- DECISION-MAKING-PATIENT
- (appraise* or summar* or distil*)
- (quer* or question or questions)

Embase (1995-)

- (("evidence-based-medicine" / all subheadings) or ((evidence or literature)) and (("decision-support-system" / all subheadings) or ("health-care-quality" / without-subheadings) or ("information-service" / without-subheadings)) and (LS=ENGLISH)
- ("decision-support-system" / all subheadings) or ("health-care-quality" / without-subheadings) or ("information-service" / without-subheadings)
- 'information-service' / without-subheadings
- 'health-care-quality' / without-subheadings
- (apprai* or summar* or distil*)
- 'decision-support-system' / all subheadings
- (('evidence-based-medicine' / all subheadings) or (evidence or literature))
- (evidence or literature)
- 'evidence-based-medicine' / all subheadings

Cochrane Library

- #1 EVIDENCE-BASED-MEDICINE single term (MeSH)
- #2 (evidence or literature)
- #3 (#1 or #2)
- #4 INFORMATION SERVICES explode tree 1 (MeSH)
- #5 INFORMATION SYSTEMS explode tree 1 (MeSH)
- #6 INFORMATION STORAGE AND RETRIEVAL explode tree 1 (MeSH)
- #7 DECISION SUPPORT SYSTEMS CLINICAL explode tree 1 (MeSH)
- #8 (inform* next service*)
- #9 (apprai* or summar* or distil*)
- #10 (#4 or #5 or #6 or #7 or #8)

  #11 (#3 and #10)

Appendix B

Second Email Questionnaire

Survey of Clinical Information Services
Centre for General Practice, School of Population Health, University of Queensland, Herston 4006 QLD Australia

Please could you spare a little time to fill out the following survey? It should take 6 minutes to complete. You can complete online or fax it back to us at: +61 7 3365 5130.
We will send you a copy of the final report if you want. Yes No

1. General Aspects
1.1. Name of service (if relevant)_____
1.2. Where was the service located?(e.g. city/area)_____
1.3. When did your service operate? From: mm/yy To: mm/yy
1.4. How many people worked in the service (staff)? _____ (use decimals for part-time)
1.5. Were you independently funded? Yes No
1.6. If Yes, from what source? _____

2. End Information Users
2.1.Which of the following groups could use your service? (Mark all that apply)
a) GPs Yes No
b) Clinicians/Specialists Yes No
c) Nurses Yes No
d) Allied Health Professionals (eg Physiotherapists) Yes No
e) Other (please specify):_____
2.2. Did end users receive any training in evidence-based medicine, question formulation, searching strategies, etc? Yes No
If Yes, please specify: _____

3. Searching Process
3.1. What was the average time from receipt of query to sending an answer?
_____hours; _____days; _____weeks
3.2. What were the modes in which questions were delivered to the information service? (Mark all that apply)
a) Phone Yes No
b) Email Yes No
c) Fax Yes No
d) Post Yes No
e) Other (please specify):_____
3.3. What was the training or background of the information service staff or searchers? (Mark all that apply)
a) Medical Yes No
b) Nursing Yes No
c) Librarian Yes No
d) Training in EBM Yes No
e) Other (Please specify):_____

3.4. Did you have an explicit cascade process for literature searching (e.g. Cochrane review, non-Cochrane systematic review, best single randomised trial, cohort study, etc)?

Yes No

Optional: If yes, then please describe your search process or algorithm:

3.5. Did you provide literature at only

the highest level of evidence? Yes No

the highest and second highest levels of evidence? Yes No

all levels of evidence? Yes No

4. Output

4.1. Was there any summary or interpretation of the search findings?

(i.e. critical appraisal, distillation, summary) Yes No

4.2. What was the format of the output? (Mark all that apply)

Written summary Yes No

Search strategy Yes No

References Yes No

Other (please specify):_____

4.3. Was there a method of 'reusing' the information from the questions for general use?

(Mark all that apply)

Posted on website Yes No

Critically Appraised Topics bank Yes No

Newsletter Yes No

Other (please specify)_____

5. Evaluation of Service

5.1. Was there a formal evaluation of the service? Yes No

If Yes, then

5.2 Were the evaluation results published? Yes No

If Yes, then please list citation. _____

What was amount of use of the service?

Estimated number of people the service was available to _____

Actual number of people who used the service _____

Number of questions generated _____

Impact of the evaluation:

a) Were the users' decisions influenced by the results from the information service?

Yes No Not evaluated

b) Was there an independent evaluation of the relevance of the clinical questions to practice? Yes No Not evaluated

6. Other Comments

If you have any other comments please feel free to note them here.

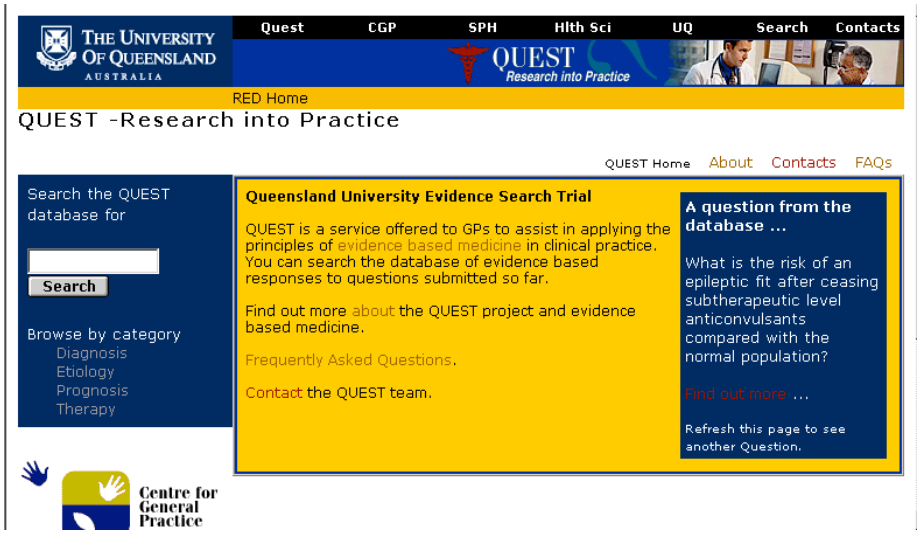
Thank you for taking the time to answer this survey on clinical information services.

Chris Del Mar MD FARCGP c.delmar@cgp.uq.edu.au
Professor of General Practice (phone) +61 7 3365 5381
University of Queensland

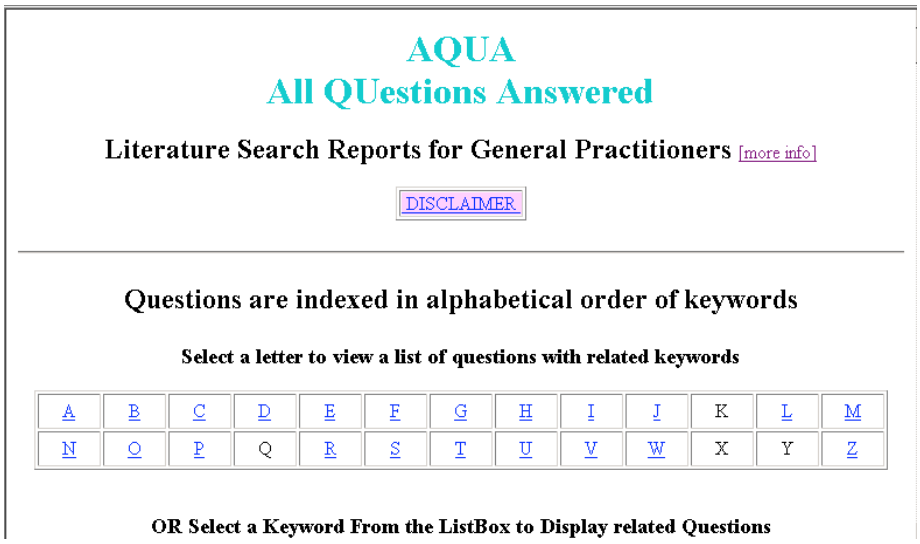
Appendix C

Clinical Information Services Websites

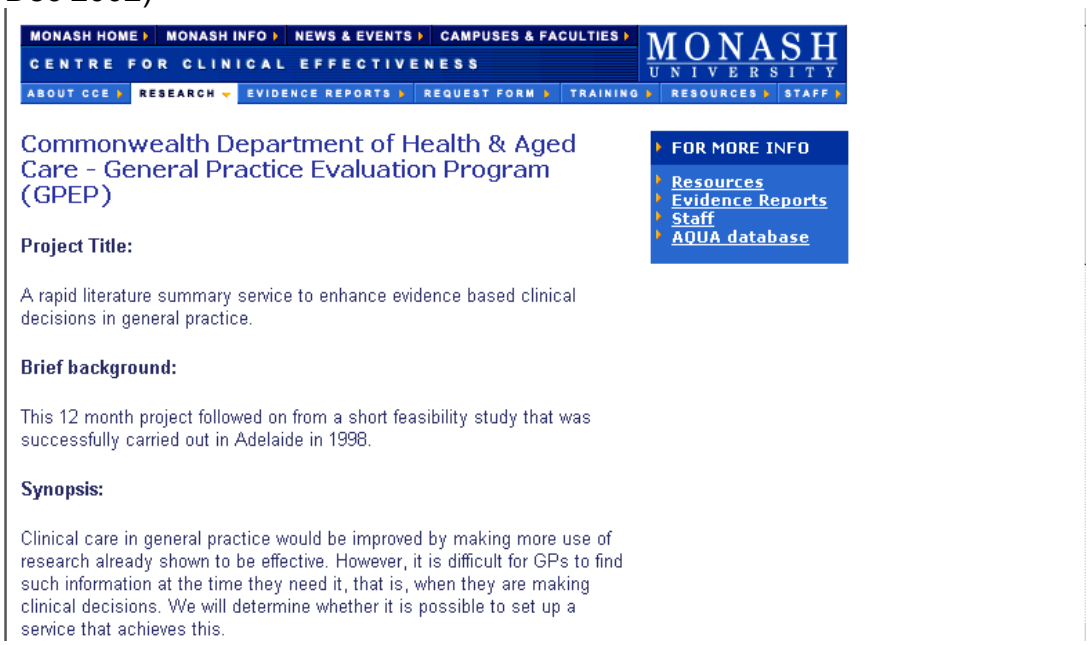
QUEST: http://www.sph.uq.edu.au/CGP/red/quest/index.asp (11 Dec 2002)



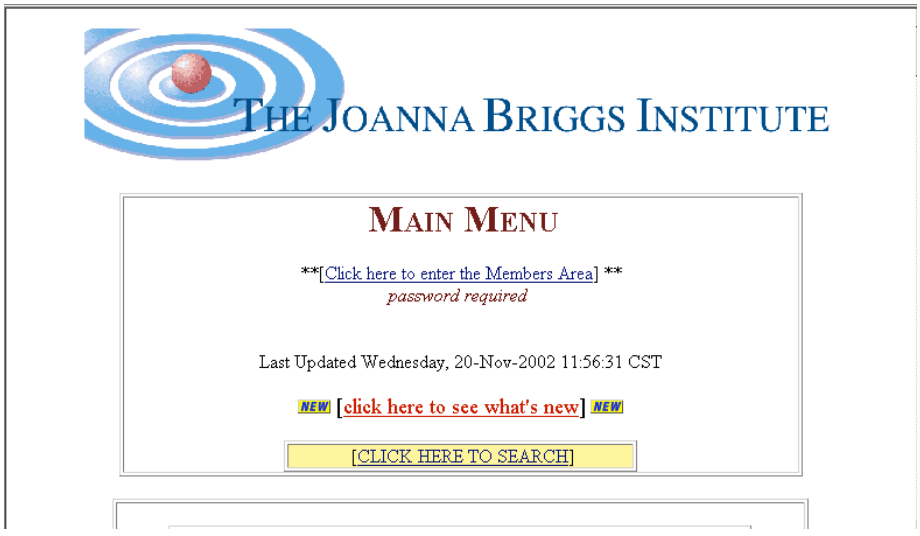
AQUA: http://www-miph.med.monash.edu.au/CCE_GPQuestion/cgi-bin/start.asp (11 Dec 2002)



AQUA: http://www.med.monash.edu.au/healthservices/cce/research/gpep.html (11 Dec 2002)



Joanna Briggs Institute: http://www.joannabriggs.edu.au/ (11 Dec 2002)



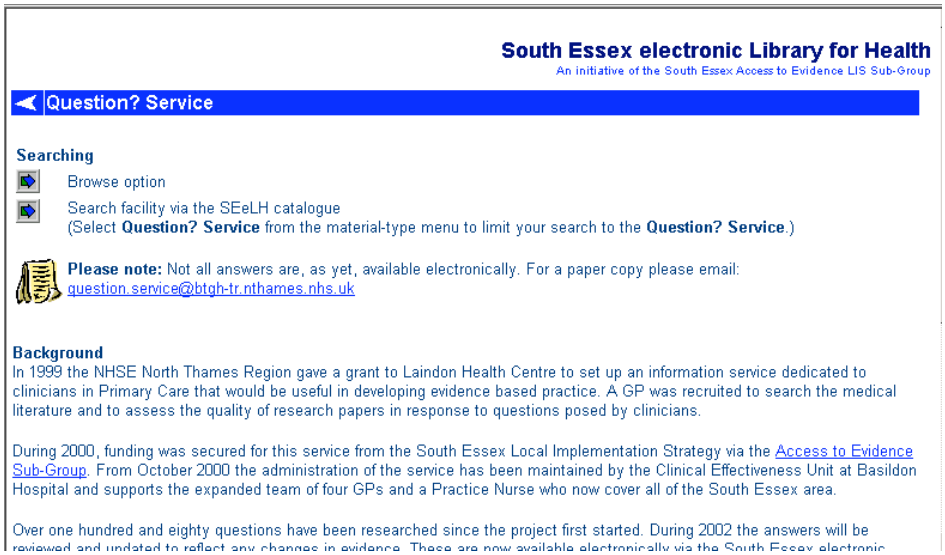
ATTRACT: http://www.attract.wales.nhs.uk/ (11 Dec 2002)

Clinical Effectiveness Enquiry Service: (11 Dec 2002)
http://www.rfc.ucl.ac.uk/campus%20services/library/Latest_news/Latest_News.htm

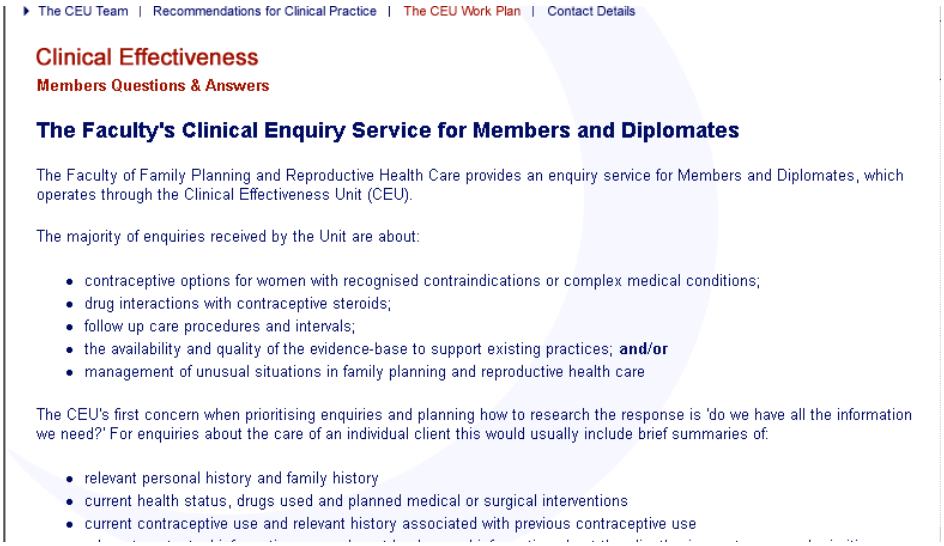
NZHTA: http://nzhta.chmeds.ac.nz/ (11 Dec 2002)

Other CIS websites

South Essex Question Service: http://www.seelh.nhs.uk/atoe/qservice.htm (11 Oct 2002)



RCOG (UK) – Faculty of Family Planning and Reproductive Health Care
http://www.ffprhc.org.uk/clinical_effect/q_and_a.html (11 Dec 2002)



Clinical Informatics Consult Service
http://www.mc.vanderbilt.edu/biolib/services/cics.html (11 Dec 2002)